

AMENDMENTS TO THE SPECIFICATION:

Please amend the paragraph beginning at page 1, line 15, as follows:

Requirements for size reductions of various electronic devices have been on the increase. The importance for size reduction of the battery for realizing the size reductions thereof has also been on ~~[[he]]~~ the increase. It is effective that a battery element for generating a power is accommodated in a thin film outer case, such as a laminated film case.

Please amend the paragraph bridging page 1, line 20-page 2, line 1, as follows:

The laminated film case comprises laminations of metal foils or sealing polymer resin layers. The laminated film case may seal the battery element by a heat-application. A high reliability of sealing the sealing portions of the laminated film case is necessary for isolating the battery element from ~~[[an]]~~ the atmosphere and also preventing leakage of the electrolyte of the battery element.

Please amend the paragraph beginning at page 2, line 2, as follows:

The sealing reliability is particularly important for the battery including ~~[[the]]~~ a non-aqueous electrolyte. If the sealing is imperfect to allow an entry of moisture from the outside of the battery case, then the electrolyte is deteriorated by the moisture, whereby the battery performance is deteriorated. Some batteries have such a structure that metal plate-shaped lead terminals extend from the battery element through the sealing portion of the laminated film case toward the outside of the case. In this case, an adhered area between the metal plate-shaped lead terminals and a sealant layer of the laminated film case is likely to be deteriorated in sealing reliability to cause a peel between them and form a leak path.

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Please amend the paragraph beginning at page 3, line 4, as follows:

The chromate-treatment is superior ~~[[than]]~~ to other surface treatments in view of ~~[[the]]~~ its anti-corrosion property. The chromate treatment is carried out by using hexavalent chromium (Cr(VI)) which is harmful substance, for which reason in the environmental viewpoint, it is desirable to use chromium-free surface treatment.

Please amend the paragraph bridging page 4, line 22-page 5, line 1, as follows:

It is moreover an object of the present invention to provide a novel film-sealed non-aqueous electrolyte battery with improved surface-treated lead terminals preventing that anti-corrosion coating films on the lead terminals are dissolved into an electrolyte.

Please amend the paragraph bridging page 5, line 23-page 6, line 2, as follows:

It is moreover an object of the present invention to provide a novel surface-treated lead terminal for a film-sealed non-aqueous electrolyte battery preventing that anti-corrosion coating films on the lead terminals are dissolved into an electrolyte.

Please amend the paragraph beginning at page 7, line 21, as follows:

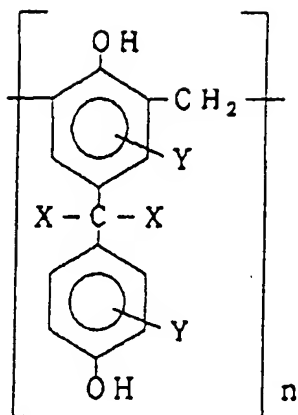
It is ~~possible~~ preferable that the anti-corrosion coating film has a thickness in the range of 5 nanometers to 1000 nanometers.

Please amend the paragraph beginning at page 7, line 23, as follows:

It is ~~possible~~ preferable that an entirety of the surface of the lead terminal is coated with an anti-corrosion coating film.

Please amend the paragraph beginning at page 8, line 1, as follows:

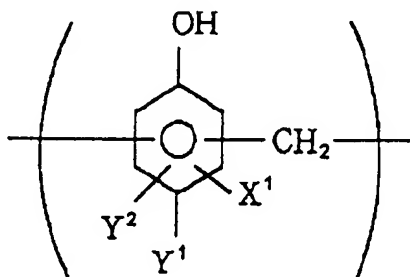
It is ~~possible~~ preferable that (A) the polymer of structural units is represented by general formula (I) :



(I)

Please amend the paragraph beginning at page 9, line 5, as follows:

It is ~~possible~~ preferable that (A) the polymer of structural units is represented by general formula (IV) :



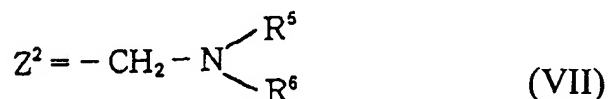
(IV)

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Please amend the paragraph beginning at page 10, line 12, as follows:

where each of "R³" and "R⁴" is independently selected from a hydrogen atom, C₁-C₁₀ alkyl groups, or C₁-C₁₀ hydroxy alkyl groups ; and if "Y¹" is represented by the general formula (VI), then each "X²" is in each structural unit represented by the general formula $[[\text{(IV)}]]$ (VI) is independently selected from a hydrogen atom or Z²-group which is represented by general formula (VII) :



Please amend the paragraph beginning at page 11, line 5, as follows:

It is ~~possible~~ preferable that the (B) phosphate compound may optionally be selected from the ~~groups~~ group consisting of phosphoric acid, phosphate, condensed phosphoric acid, condensed phosphate, zirconium phosphate, and titanium phosphate. Examples of available salts are alkali metal salts such as ammonium salts, sodium salts, and potassium salts.

Please amend the paragraph beginning at page 11, line 10, as follows:

It is ~~possible~~ preferable that the (C) titanium fluorine compound may optionally be from the group consisting of titanium hydrofluoric acid, and titanium borofluoric acid.

Please amend the paragraph beginning at page 11, line 13, as follows:

It is ~~possible~~ preferable that the lead terminal may comprise aluminum mainly.

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Please amend the paragraph beginning at page 11, line 15, as follows:

It is ~~possible~~ preferable that the non-aqueous electrolyte may include a lithium salt of an inorganic fluoride

Please amend the paragraph bridging page 11, line 23-page 12, line 2, as follows:

It is also ~~possible~~ preferable that a entirety of surface the lead terminal is coated with the anti-corrosion coating films. In this case, it is preferable that the lead terminal comprises : a core structure comprising a metal foil ; and the anti-corrosion coating film coating the core structure.

Please amend the paragraph beginning at page 12, line 3, as follows:

If the lead terminal has a sectioned area of circle and oval shape, then it is preferable that the entirety of surface of the lead terminal is coated with the anti-corrosion coating film.

Please amend the paragraph beginning at page 14, line 7, as follows:

The film-sealed non-aqueous electrolyte battery further includes a positive electrode lead terminal 31 and a negative electrode lead terminal 32. The positive electrode lead terminal 31 is electrically connected to the positive electrode of the battery element 4. The negative electrode lead terminal 32 is electrically connected to the negative electrode of the battery element 4. The battery element 4 and the positive and negative electrode lead terminals 31 and 32 are accommodated in the film case 5, provided that the positive and negative electrode lead terminals 31 and 32 project outside from the film case 5 through a sealing portion, where the positive and negative electrode lead terminals 31 and 32 are in contact directly and tightly with the sealant polymer resin films 1. As described below, at least one of the positive and negative electrode lead terminals 31 and 32 is coated with an anti-corrosion film.

Please amend the paragraph bridging page 15, line 19-page 16, line 14, as follows:

The anti-corrosion film of the lead terminal is so thin as to have such an appropriate mechanical strength that the anti-corrosion film is allowed to be broken at connection point in electrical connection between the lead terminal and the battery element or between the lead terminal and other device than the battery, resulting in no generation of contact resistance. An ultrasonic welding method and a resistance welding are examples of the available method for electrically connecting the lead terminals to the battery element. In those methods, a welding point of the lead terminal surface receives a friction and causes a micro-fusion or melting, whereby the thin anti-corrosion film is likely to be broken, thereby ensuring an electrical connection through welding between the lead terminal and the electrode of the battery element. The lead terminal may also be connected electrically ~~[[to]]~~ by any available cramping methods, for example, using a crocodile clip. In this case, the thin anti-corrosion film is likely to be broken, thereby ensuring an electrical connection through ~~welding~~ cramping between the lead terminal and the electrode of the battery element. In this viewpoint of allowing easy breaking the anti-corrosion film in cramping process or welding process for electrical connection between the lead terminal and the battery element, a preferable thickness of the anti-corrosion film is ranged from 5 nanometers to 500 nanometers.

Please amend the paragraph beginning at page 18, line 3, as follows:

It has been generally known that leak paths are likely to be formed at sides of the lead terminal which is sealed by the film case. The anti-corrosion film may contribute to prevent formation of the leak paths because the sealant polymer resin film 1 is ~~melt~~ melted in the heat-

sealing process, and the anti-corrosion film improves the wettability of the melt sealant polymer resin over the anti-corrosion film of the lead terminal.

Please amend the paragraph beginning at page 18, line 9, as follows:

If the original metal foil is coated with the anti-corrosion film and then the surface-coated metal foil is cut at a predetermined ~~with~~ width, then the sectioned surfaces of the cut surface-coated metal foil are not coated with the anti-corrosion film. However, the process efficiency is higher than the above processes, wherein the original metal foil is cut at the predetermined ~~with~~ width to form plural metal foils which are then surface-coated with the anti-corrosion film.

Please amend the paragraph beginning at page 18, line 16, as follows:

In the above described example, the lead terminal has a rectangle sectioned shape. It is also possible that the sectioned shape of the lead terminal is optional. For example, ~~[[the]]~~ a circle or oval shape is of course available as the sectioned shape of the lead terminal.

Please amend the paragraph bridging page 18, line 20-page 19, line 5, as follows:

Japanese laid-open patent publication No. 10-312788 discloses that the surface treatment is selectively carried out only to the sealing portion of the led terminal in ~~considerations~~ consideration of a possible dissolution of the coating film into the electrolyte and also of a possible defect of welding the lead terminal to the electrode of the battery element, whereby the welding defect causes the contact resistance. For carrying out the selective surface treatment, it was proposed that the coating film is selectively polished or dissolved, or proposed that the surface treatment is carried out by using a mask of a tape, for example, a mending tape. Those additional processes makes it difficult to achieve the efficient productivity.

Please amend the paragraph bridging page 19, line 17-page 20, line 1, as follows:

Japanese laid-open patent publications Nos. 9-31404 and 10-46101 disclose that titanium fluorine compound is mixed into a treating liquid containing phenol polymer and phosphate compound to prepare a treatment liquid which is then used for carrying out a surface treatment of the lead terminal. In order to improve the adhesion reliability between the lead terminal and the sealant polymer resin film, it is preferable that the anti-corrosion film contains a phosphate compound. It is more preferable that anti-corrosion film contains both a phosphate compound and a titanium fluorine compound for the following reasons.

Please amend the paragraph beginning at page 21, line 1, as follows:

There are no particular limitations to the battery element 4 including the positive and negative electrodes and the separator as essential elements. For example, the battery element 4 may comprise laminations of plural ~~plate~~ flat plates, a rolled structure of plates, and a flat-rolled structure of plates. In view of ensuring the large capacity, the flat-rolled structure of plates might be preferable.

Please amend the paragraph beginning at page 22, line 5, as follows:

There are also no particular limitations to the negative electrode, provided that the negative electrode is capable of absorbing and emitting cations. Examples of the available materials for the negative electrode are crystal carbons such as graphitized carbons obtained by a high temperature heat treatment to natural black carbon, coal pitch and oil pitch, and amorphous carbons obtained by a heat treatment ~~[[to]]~~ of coal, oil-pitch cokes, and acetylene-pitch cokes, as well as known negative electrode active materials for the secondary battery such as metal lithium and lithium alloys such as AlLi.

Please amend the paragraph bridging page 23, line 13-page 24, line 10, as follows:

The film case 5 may preferably comprise laminations of the metal thin film 2 and the sealant polymer resin film 1. The metal thin film 2 acts as gas barrier film. The sealant polymer resin film 1 acts as sealing the film case 5. There are no particular limitation to the respective thicknesses of the metal thin film 2 and the sealant polymer resin film 1. The sealant polymer resin film 1 is the most inner film. A thermally stable protective layer is the most outer film, provided that the thermally stable protective layer is not illustrated in the drawings. Polyester, polyamide and liquid crystal polymer are available as the protective layer. Thermoplastic resins are also available as the base materials for the sealant polymer resin film 1, for example, polyethylene, polypropylene, ionomer, acidic-denatured polyethylene such as acidic-denatured polyethylene terephthalate, acidic-denatured polypropylene such as acidic-denatured polypropylene terephthalate, polyethylene terephthalate (PET), polyethylene naphthalate (PEN), polyethylene isophthalate (PEI), a blend of PET and PEN, a blend of PET and PEI, polyamide resins, a blend of a polyamide resin and PET, and a blend of ~~xylylene~~ xylylene base containing polyamide and PET. Those resins may be used solely or in combination to form a multi-layered structure of the sealant polymer resin film 1. Those multilayers may optionally be adhered by an adhesive agent. Al, Sn, Cu, Ni, and stainless steel are available as the metal layer 2 for acting as the gas barrier. A thickness of the metal layer 2 may be ranged from 5 micrometers to 500 micrometers.

Please amend the paragraph bridging page 24, line 19-page 25, line 6, as follows:

The heat sealing process for sealing the film-sealed non-aqueous electrolyte battery may be carried out as follows. A heater may be ~~sued~~ used which comprises a metal resistance in the form of ribbon or block. The heater may be pressed to the sealing portion of the film case 5

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before a current may be applied to the heater at a predetermined time for generating a predetermined heat. A metal block maintained at a predetermined temperature may be pressed to the sealing portion of the film case 5. The lead terminal may be selectively heated by a high frequency induction heating method whilst the sealing portion of the film case 5 may be pressed. The lead terminal may be selectively heated by applying eddy current to the lead terminal to generate Joule's heat whilst the sealing portion of the film case 5 may be pressed.

Please amend the paragraph beginning at page 25, line 9, as follows:

There are no particular ~~limitation~~ limitations to the manufacturing processes for the film-sealed non-aqueous electrolyte battery. The positive electrode lead terminal 31 and the negative electrode lead terminal 32 may be electrically connected to the battery element 4 by the ultrasonic welding method. The battery element 4 is enclosed by the film case 5, wherein the positive electrode lead terminal 31 and the negative electrode lead terminal 32 project from a first side of the film case 5. The first side of the film case 5 is heat-sealed, and one of the remaining two sides of the film case 5 is also heat-sealed. The electrolyte solution is injected through the remaining unsealed side of the film case 5, before the remaining unsealed side of the film case 5 is finally heat-sealed under a reduced pressure condition.

Please amend the paragraph beginning at page 26, line 1, as follows:

EXAMPLE 1 :

Lithium manganate ~~powers~~ powders of spinel structure, carbon donor providing [[a]] conductivity, and polyvinylidene fluoride were blended at weight ratios of 90 : 5 : 5 ~~to form into~~ N-methylpyrrolidone (hereinafter referred to as NMP). ~~NMP was then and~~ stirred to form a slurry containing NMP. An amount of NMP was adjusted in consideration of viscosity of the slurry.

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The slurry was uniformly applied by a doctor blade onto a first surface of an aluminum foil of 20 micrometers in thickness which is a positive collector for subsequent dry process in vacuum pressure at 100°C for 2 hours. The slurry was also uniformly applied onto a second surface of the aluminum foil for subsequent dry process in vacuum pressure. This sheet was then rolled and pressed to form a positive electrode active material layer. A theoretical capacity was 600 mAh.

Please amend the paragraph bridging page 26, line 14-page 27, line 1, as follows:

Amorphous carbon ~~powers~~ powders, and polyvinylidene fluoride were blended at weight ratios of 91 : 9 to form into N-methylpyrrolidone (hereinafter refereed to as NMP). ~~NMP was then and~~ stirred to form a slurry containing NMP. An amount of NMP was adjusted in consideration of viscosity of the slurry. The slurry was uniformly applied by a doctor blade onto a first surface of a copper foil of 10 micrometers in thickness which is a negative collector for subsequent dry process in vacuum pressure at 100°C for 2 hours. A ratio in theoretical capacity for a unit area of the negative electrode layer to the positive electrode layer was adjusted to be 1 : 1. The slurry was also uniformly applied onto a second surface of the copper foil for subsequent dry process in vacuum pressure. This sheet was then rolled and pressed to form a negative electrode active material layer.

Please amend the paragraph bridging page 27, line 16-page 28, line 8, as follows:

A rolled structure of an aluminum flat plate with sizes of 4 mm in width, 0.1 mm in thickness and 100 mm in length was prepared. The aluminum flat plate was ~~pull~~ pulled out from the rolled structure for subsequent surface-treatment thereto before the surface-treated aluminum flat plate was again rolled. The surface-treatment was carried out by applying a surface treatment liquid onto first and second main surfaces and side faces of the aluminum flat plate, whereby a

coating film of 200 nanometers in thickness were formed on the first and second main surfaces and the side faces of the aluminum flat plate, and further dry ~~process~~ processed at 120°C for 20 seconds. The used surface treatment liquid includes (A) a polymer of structural units of a phenolic compound, where at least a part of the structural units includes a substituent which comprises an amino group or a substituted amino group ; (B) a phosphate compound ; and (C) a titanium fluorine compound. The surface-treated aluminum flat plate was then cut out at 100 mm to form a plurality of the positive electrode lead ~~terminal~~ terminals. The surface treatment liquid is commercially available from Nihon Parkerizing Co., Ltd.

Please amend the paragraph bridging page 28, line 19-page 29, line 6, as follows:

The above heat-sealing process was carried out at 190°C for 10 seconds, wherein the positive electrode lead terminal and the negative electrode lead terminal project from the above first side of the laminate film. The above first side, from which the positive electrode lead terminal and the negative electrode lead terminal project, was opposite to the folding side. The above first and second sides of the laminate film were heat-sealed and then the electrolyte was impregnated into the electrode-rolled structure before the third side of the laminate film was heat-sealed. The electrolyte-impregnated electrode-rolled structure substantially corresponds to the battery element 4 shown in FIGS. 2 and 3. The electrolyte was used which ~~comprise~~ comprised a 1mol/liter of LiPF_6 as a supporting salt and a mixing solvent of diethyl carbonate and ethylene carbonate of 50 : 50 in weight ratio.

Please amend the paragraph bridging page 29, line 13-page 30, line 1, as follows:

EXAMPLE 2 :

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Lithium manganate ~~powers~~ powders of spinel structure, carbon donor providing [[a]] conductivity, and polyvinylidene fluoride were blended at weight ratios of 90 : 5 : 5 ~~to form~~ into N-methylpyrrolidone (hereinafter refereed to as NMP). ~~NMP was then~~ and stirred to form a slurry containing NMP. An amount of NMP was adjusted in consideration of viscosity of the slurry. The slurry was uniformly applied by a doctor blade onto a first surface of an aluminum foil of 20 micrometers in thickness which is a positive collector for subsequent dry process in vacuum pressure at 100°C for 2 hours. The slurry was also uniformly applied onto a second surface of the aluminum foil for subsequent dry process in vacuum pressure. This sheet was then rolled and pressed to form a positive electrode active material layer. A theoretical capacity was 600 mAh.

Please amend the paragraph beginning at page 30, line 2, as follows:

Amorphous carbon ~~powers~~ powders, and polyvinylidene fluoride were blended at weight ratios of 91 : 9 ~~to form~~ into N-methylpyrrolidone (hereinafter refereed to as NMP). ~~NMP was then~~ and stirred to form a slurry containing NMP. An amount of NMP was adjusted in consideration of viscosity of the slurry. The slurry was uniformly applied by a doctor blade onto a first surface of a copper foil of 10 micrometers in thickness which is a negative collector for subsequent dry process in vacuum pressure at 100°C for 2 hours. A ratio in theoretical capacity for a unit area of the negative electrode layer to the positive electrode layer was adjusted to be 1 : 1. The slurry was also uniformly applied onto a second surface of the copper foil for subsequent dry process in vacuum pressure. This sheet was then rolled and pressed to form a negative electrode active material layer.

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Please amend the paragraph beginning at page 31, line 4, as follows:

A rolled structure of an aluminum flat plate with sizes of 40 mm in width, 0.1 mm in thickness and 100 mm in length was prepared. The aluminum flat plate was ~~pull~~ pulled out from the rolled structure for subsequent surface-treatment thereto before the surface-treated aluminum flat plate was again rolled. The rolled-structure of the surface-treated plate with the wide width of 40 mm was then slit at a width of 4 mm.

Please amend the paragraph beginning at page 31, line 10, as follows:

The surface-treatment was carried out by applying a surface treatment liquid onto first and second main surfaces and side faces of the aluminum flat plate, whereby a coating film of 50 nanometers in thickness were formed on the first and second main surfaces and the side faces of the aluminum flat plate, and further dry ~~process~~ processed at 120°C for 20 seconds. The used surface treatment liquid includes (A) a polymer of structural units of a phenolic compound, where at least a part of the structural units includes a substituent which comprises an amino group or a substituted amino group ; (B) a phosphate compound ; and (C) a titanium fluorine compound. The surface-treated aluminum flat plate was then cut out at 100 mm to form a plurality of the positive electrode lead ~~terminal~~ terminals. The surface treatment liquid is commercially available from Nihon Parkerizing Co., Ltd.

Please amend the paragraph beginning at page 32, line 8, as follows:

The above heat-sealing process was carried out at 190°C for 10 seconds, wherein the positive electrode lead terminal and the negative electrode lead terminal project from the above first side of the laminate film. The above first side, from which the positive electrode lead terminal and the negative electrode lead terminal project, was opposite to the folding side. The

above first and second sides of the laminate film were heat-sealed and then the electrolyte was impregnated into the electrode-rolled structure before the third side of the laminate film was heat-sealed. The electrolyte-impregnated electrode-rolled structure substantially corresponds to the battery element 4 shown in FIGS. 2 and 3. The electrolyte was used which ~~comprise~~ comprised a 1mol/liter of LiPF_6 as a supporting salt and a mixing solvent of diethyl carbonate and ethylene carbonate of 50 : 50 in weight ratio.

Please amend the paragraph beginning at page 33, line 14, as follows:

Two of the ~~battery~~ batteries of Example 1, two of the ~~battery~~ batteries of Example 2, two of the ~~battery~~ batteries of Comparative Example 1 and two of the ~~battery~~ batteries of Comparative Example 2 were prepared for the following evaluations. First one of the two batteries of each of Examples 1 and 2 and Comparative Examples 1 and 2 was subjected to the following peeling test immediately after the battery was prepared. The second one was subjected to the peeling test after the following 500-cycle charge/discharge test was carried out.

Please amend the paragraph bridging page 35, line 21-page 36, line 3, as follows:

The batteries in Examples 1 and 2 exhibited almost uniform performances from first to five hundredth cycles. This result shows that no contact resistance was generated at a connection point between the lead terminal and the battery element as well as another connection point between the lead terminal and the used charge/discharge apparatus. This result also shows that the anti-corrosion film on the lead terminal was not ~~dislosed~~ dissolved into the electrolyte.

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